Non-Fat Dry Milk (NDM) in Beef and Sheep Drought Diets

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Introduction and Usage

Non-fat dried milk is being made available to Utah foundation herds of beef, bison, sheep and goat. It is an excellent source of degradable protein (DIP), energy, calcium and phosphorus stimulates microbial protein synthesis by supplying peptides, amino acids and readily available carbohydrate (energy). Limitations are that non-fat dry milk will supply no undegradable protein (UIP). Higher levels may also cause negative associative effects from the lactose in forage-based diets. This could result in the forage component of a diet containing high levels of NDM becoming less digestible. Handling bagged dry milk poses problems in storage and feeding. It is important to obtain advice on handling before determining value. Pelleting, cubing or blocking may be possible but at low inclusion rates of NDM (no more than 5-10%).

Dry Milk, however, works best in drylot or sacrificial pasture as a tool to keep cattle off drought-stricken rangeland to give it more time to recover. Cattle in such confined areas would not have access to main pastures, thus giving drought-stricken rangeland a longer recuperation time. Keeping grazing pressure off pastures in the year of recovery from drought is crucial in helping grasslands recover sooner. The NDM could also provide producers with the option of bartering NDM to feed manufacturers in exchange for other feed products. NDM has been assigned a minimum value of $80/ton but producers may be able to negotiate with feed manufacturers for prices above that level. That might help producers purchase mineral supplements for use in the spring or later in the year.

Composition of Non-Fat Dry Milk: Protein: 34-37%, TDN: 90%, Lactose: 50-52%, Fat: .6-1.25%, Ash: 8.2-8.6%, Calcium: 1.35%, Phosphorus: 1.1% and Potassium 1.7%

- Protein is 80% casein and 20% whey and is essentially 100% degraded in the rumen. (Taniguichi et al., 1995, Journal of Animal Science 73:236; Koster et al., 1996, Journal of Animal Science 74:2473; Stock et al., 1986, Journal of Animal Science 63:1561).

- Energy is equal to or better than corn. Contains 50% lactose which is rapidly degraded in the rumen.

- Source of rumen degradable protein for low-quality forage diets – stimulates microbial growth. (Stock et al., 1986, Journal of Animal Science 63:1574; Hendrix, et al., 1973, Nebraska Beef Cattle Report 73:17; Prokop et al., 1976, Nebraska Beef Cattle Report 76:37).

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Protein in forage based diets

Non-fat dry milk will work well as a degradable intake protein (DIP) source in corn silage based diets, grass hay diets, crop residue diets such as grazing cornstalks, harvested stalks, or wheat or barley straw, and will work well in grazing low-protein range. Because this product is 100%

DIP, adding more than is needed for DIP will not further increase protein supply to the animal. Unlike urea, toxicity is not a problem when fed at moderate levels (less than two lb/day for cattle and bison and .5 lbs/day for sheep and goats).

Protein in limit-fed beef concentrate diets
In situations where are maintained by limit-feeding high-concentrate diets or with backgrounding calves on high-energy diets, NDM will provide an excellent protein source.

Complementary protein sources
Another approach for this product is to mix NDM with other protein sources that may complement its use. A 50:50 mixture (DM basis) of non-fat dried milk and dried distillers grains will supply a 35% protein product that is 70% DIP, 30% UIP. This mixture is equivalent to soybean meal in degradability, but lower in total protein while feeding rates may be higher than with soybean meal, this mixture would work well in most feeding programs. This mixture ensures that microbial protein requirements are met in the rumen (DIP) while supplying enough bypass protein or UIP to meet the animal's protein requirements. Other UIP protein sources can be used with this product to help complement its protein profile. However, we recommend relatively cheap sources such as dried distillers grains, cottonseed meal or hulls, or feather meal. Because feather meal is much higher in total protein (85% CP; 60% UIP), very little is required relative to non-fat dried milk. Availability of these products would have to be determined.

Energy source
Lactose is the predominant sugar in non-fat dried milk and will probably feed like starch. Caution is required because the sugar is rapidly available in the rumen and the particle size is very small in this product. Proper mixture is required or limiting its use to avoid digestive upsets. We are recommending that no more than 2 lbs/day be fed for cattle and bison and .5 lbs/day for sheep and goats. Some have observed an increased incidence of bloat in cattle with higher feeding levels.

Handling and storage
This product does not handle like traditional feedstuffs. The product is a very fine particle, dry product, and is available in bags. Therefore, the product should be removed from bags, which is challenging when large amounts are being handled. The product will not flow well through mills, but can be handled with front-end loaders, or belts. Because this is a dry product, moisture should not be added to the product during storage but moisture added at the time of feeding may improve handling characteristics and palatability.

Ration Suggestions for Foundation Herds and Flocks

Beef Cow Gestation (1200 lb beef cow in dry lot):

Grass Hay (7.0% Crude protein)	- 16 lbs
Corn Grain	- 3 lbs
NDM	- 2 lbs

Beef Cow Lactation:
Same amounts of corn grain and NDM but increase grass hay to 19 lbs.

These rations would provide 10.3% Crude Protein, 69% TDN at a cost of $80/Head /Day for Gestation and $.84/Head/Day for Lactation based on Grass Hay @ $80/Ton and Corn Grain @ $5.00/cwt

Supplementing NDM free choice on range or pasture is not recommended by itself, but as an option could be mixed in with corn or barley and fed to beef cows at a rate of 3 lbs concentrate and 1 lb NDM per head per day. Steps should be taken to insure even distribution between animals. This would be difficult to achieve and may not be feasible on many pastures or rangeland.

Rations for replacement heifers using NDM can also be developed based on available feedstuffs. The NDM would provide valuable protein for growth and development.

Ration Suggestions (Lactating Ewes first 8 weeks of lactation nursing twins)

	Ration 1		Ration 2	
Feed	As Fed	DM	As Fed	DM
Alfalfa Hay	4.75	4.29	4.2	3.78
Whole Corn	1.00	.9	1.5	1.35
NDM	.5	.48	.4	.38
TOTAL FED	6.25	5.67	6.1	5.52

	Req'd.(lb.)	Fed Ration #1	Fed Ration #2
DM	6.09 (max)	5.67	5.52
TDN	3.96 (min)	3.96	3.96
CP	.92 (min)	1.20	1.10
Ca	.024 (min)	.087	.077
P	.018 (min)	.028	.025

Conclusion

As noted above, NDM would work best in drylot or sacrificial pasture as a tool to keep cattle off drought-stricken rangeland to give it more time to recover. It is recommended that producers consult with their County Extension Agent or Feed Company Nutritionist if in doubt concerning usage of NDM. If handled properly, and fed as intended, NDM will provide a nutritious supplement for livestock.